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ABSTRACT

Six motivational items from the North Carolina Central University freshman survey were investigated as possible predictors in the undergraduate admission equation. Equations were computed using data from 1976 to 1978, employing a double cross-validation design. A scale combining the six motivational questions was used in the equation along with the rank in the high school class and math and verbal scores from the Scholastic Aptitude Test (SAT). The multiple regression for the 1976 class increased significantly with the addition of the motivation scale, as did the multiple regression for the 1978 class. When the weights of the regression equations which included the motivational questions were applied to the opposing sets of data to obtain predicted grade point averages, the correlation was .39 when the 1978 equation was applied to the 1976 class data and .43 when the 1976 equation was applied to the 1978 class data. The results are interpreted as indicating that the motivation scale has promise as a noncognitive predictor. The findings are discussed in light of the Bakke decision and the relative SAT scores of whites and minorities. (Author/SW)

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THE USE OF NON-COGNITIVE VARIABLES IN PREDICTING GRADE POINT AVERAGES OF STUDENTS IN A PREDOMINANTLY BLACK COLLEGE

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This paper was presented at the Twentieth Annual Forum of the Association for Institutional Research held at the Peachtree Plaza Hotel in Atlanta, Georgia, April 27 - May 1, 1980. This paper was reviewed by the AIR Forum Publications Committee and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC Collection of Forum papers.

Mary Corcoran
University of Minnesota
(Editor, AIR Forum Publications)

ABSTRACT

THE USE OF NON-COGNITIVE VARIABLES IN PREDICTING GRADE POINT AVERAGES OF STUDENTS IN A PREDOMINANTLY BLACK COLLEGE

Six motivational items from the North Carolina Central University freshman survey were investigated as possible predictors in the undergraduate admission equation. Equations were computed using data from 1976 and 1978, employing a double cross-validation design. A scale combining the six motivational questions was used in the equation along with the rank in the high school class and the SAT math and verbal scores. The multiple R for the 1976 class increased significantly with the addition of the MOTIV scale, as did the multiple R for the 1978 class. When the weights of the regression equations which included the motivational questions were applied to the opposing sets of data to obtain predicted grade point averages, the correlation was .39 when the 1978 equation was applied to the 1976 class data and .43 when the 1976 equation was applied to the 1978 class data. The results indicate that the motivation scale has promise as a non-cognitive predictor.

The findings are discussed in light of the Bakke decision and of the relative SAT scores of whites and minorities.

THE USE OF NON-COGNITIVE VARIABLES IN PREDICTING GRADE POINT AVERAGES OF STUDENTS IN A PREDOMINANTLY BLACK COLLEGE

Those committed to increasing the number and proportion of black and minority students enrolled in institutions of higher education have become increasingly concerned with the admission status of these students. The Bakke decision has raised serious questions about the legality of some procedures designed to increase minority admissions in graduate and professional schools (and in highly selective undergraduate colleges and universities as well). If these institutions retreat to traditional admission procedures, relying heavily on standardized test scores, then the current low admission rate for black and minority students may be depressed even further.

This concern was heightened by the College Board's recent release of average Scholastic Aptitude Test (SAT) and Graduate Record Examination (GRE) scores broken down by race. During the five-year period between 1972-73 and 1976-77, the blacks who took the SAT scored "....an average of 119 points lower than whites on the verbal section and 134 points lower than whites on the mathematics section..." (Jacobson, 1980). Chicanos' scores were higher than scores of blacks but were still substantially below the scores of whites. Average scores of two 1978 administrations of the Graduate Record Examination (GRE) followed a similar pattern. In light of these data, selective admission procedures based only on grades and standardized test scores will admit very few blacks and Chicanos.

Other admission criteria must be examined if minority enrollment is to increase or even remain at its present levels. One answer may be the use of various non-cognitive variables as predictors. Examples of those currently

in use by a few institutions are demographic variables such as the location of the high school (rural and inner city urban locations are given preference), the Myers-Briggs Type Indicator, and hours worked in high school or college (Fuller, McNemar, and Green, 1978).

North Carolina Central University (NCCU) has been concerned with finding alternative admission criteria (Nelsen and Uhl, 1974; Uhl and Pratt, 1977). Obviously such criteria have implications for NCCU's admission process since NCCU is a traditionally black university. In addition, many at NCCU are committed to improving the educational opportunities of black students at other institutions. The Office of Research, Evaluation and Planning at NCCU has attempted to identify quantitative, non-cognitive variables which, in addition to standard cognitive variables, might prove useful in predicting the academic performance of its students. Earlier research (Uhl and Pratt, 1977) reported six motivational items which appeared useful in predicting the performance of students in NCCU's Law School. Table 1 lists these six motivational items.

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Insert Table 1 about here
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Since the six motivational questions had been included on a survey given to incoming freshmen in 1976 and 1978, the present research was undertaken to determine if these variables might also prove valuable in predicting undergraduate grade-point averages.

METHOD

Sample

The samples of 392 freshmen entering NCCU in 1976 and 270 entering freshmen from the 1978 class were representative of the black entering freshmen in these two classes. Since the question dealt with minorities,

the small number of white freshmen were excluded from this study. Sixty-four percent of the students in the 1976 sample were female as were 59% of the students in the 1978 sample. These percentages compared to 59% females in the 1976 freshman class and 61% females in the 1978 freshman class.

Instruments

The 1976 survey consisted of the College Student Questionnaires (Educational Testing Service, 1965), Part 1, with the addition of nine locally developed questions. The 1978 survey included some questions from the CSQ and other items of interest to the institution for a total of 110 items. The six motivational questions listed in Table 1 were included in both surveys.

Procedure

Freshmen surveys are administered to all NCCU students enrolled in freshmen orientation classes on a biennial basis. Eighty-four percent of first-time freshmen completed the survey in 1978 and 70% completed the 1976 survey.

The data were analyzed using a multiple regression procedure. In all analyses, the grade-point average for the first semester of the freshman year was the criterion variable. Preliminary analyses indicated that one question, Q2, was suitable for use as a predictor for both samples when the standard admission variables of rank in high school class (HSR) and Scholastic Aptitude Test (SAT) scores were included. Therefore, two analyses were computed for each sample: one in which Q2 was a predictor along with the two SAT scores and the HSR, and a second in which a scale composed of all six motivational questions (MOTIV) was a predictor along with SAT verbal and math scores (SATV and SATM) and HSR.

The next step was cross-validation of the formulas. A double cross-validation procedure was employed; i.e., predicted grade-point averages

(PGPA's) for 1978 freshmen were computed using weights from formulas developed for the 1976 data set and the correlations between these and actual GPA's were obtained. The procedure was reversed with weights from the 1978 formulas used to obtain PGPA's for the 1976 students.

RESULTS

Table 2 contains results of these four analyses as well as the multiple R's which were computed with only the HSR, the SATV, and SATM as predictors. Note that the multiple R's of all three models (with Q2, with MOTIV, and with only SAT scores and HSR) were larger for the 1978 sample than for the 1976 sample.

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Insert Table 2 about here
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F-tests[1] were computed to determine whether the models with Q2 or with the MOTIV scale added as predictors accounted for a significantly increased portion of the variance when compared to the model with only SAT scores and HSR. As indicated in Table 2, the addition of a motivational variable, whether as an individual variable or as a scale reduced the error in the 1976 model. The error was also significantly reduced in the 1978 model in which the MOTIV scale was used as a predictor.

Table 3 contains a summary of the double cross-validation procedures. Expected R's were computed so that the obtained correlations could be compared with those expected when these formulas are applied to a new set of data. A formula recommended by Uhl and Eisenberg (1976) was used to compute these expected R's.

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Insert Table 3 about here
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Reviewing Table 3, it appears that the formula containing the MOTIV scale and developed on the 1976 data set is the most stable, i.e., yields the highest correlation in the cross-validation procedure. Note that the PGPA computed using the weight in this formula correlates .433 with the obtained GPA of the 1978 freshmen. This compares favorably with the multiple R of .458 obtained when the same four predictors were used in the multiple regression computed on the 1978 data.

DISCUSSION

The results of the study are encouraging. It appears that these or similar non-cognitive variables, particularly motivational ones, may prove to be useful predictors for admission when combined with traditional cognitive variables.

During the planning stages of this study, it was hoped that one or two of the motivational questions could be isolated as predictors, primarily because of the relative ease of adding one or two, as opposed to six, questions to an admission form. On the basis of this study, however, the MOTIV scale appears to be a preferable predictor. As one might expect, single questions seem to be unstable predictors. However, a revised subset of three or four of these questions might prove to be useful and stable. Though there are problems with using questions such as these as predictors (including the possibility that students may become aware of the desired answers, thus invalidating the formula), the approach is promising. Further study of the problem is indicated.

The importance of finding such non-cognitive variables is becoming increasingly apparent. A decline in the admission of black students to public colleges has already been noted (Middleton, 1980). While the etiology

of this decrease is not clear, the decline does coincide with the Bakke decision. Thus the commitment to enroll blacks and minorities must be reinforced by efforts to identify valid combinations of predictors including non-cognitive as well as traditional cognitive variables.

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FOOTNOTE

1. The test employed the following formula (Bottenberg and Ward, 1963).

$$F = \frac{(R_1^2 - R_2^2) \,/\, (p_1 - p_2)}{(1 - R_1^2) \,/\, (n - p_1)}$$

Where

R_1^2 = R-square of the full model

R_2^2 = R-square of the restricted model

p_1 = number of independent predictors in the full model

p_2 = number of independent predictors in the restricted model

df numerator = $p_1 - p_2$

df denominator = $n - p_1$

n = the number of subjects

Table 1

The Six Motivational Questions Used as Predictors[1]

Questions[2]
1. Compared with most of your classmates, how much would you say you studied during your senior year in high school?
2. Do you think your fellow students in high school thought of you as a hard worker?
3. Did you try harder to get on (and stay on) the honor roll or merit list than the average student in your high school class?
4. Do you tend to give up or delay on uninteresting assignments?
5. In terms of your own personal satisfaction, how much importance do you attach to getting good grades?
6. Did you regard yourself as a more consistent and harder worker in your classroom assignments than the typical student in your high school classes?

[1]The response choices used with these questions have been omitted.

[2]These questions are Q78, Q81, Q83, Q84, Q85, and Q88 in the CSQ, Part 1.

Table 2

Multiple R's of Regression Analyses of the 1976 and the 1978 Data

Model	Multiple R's 1976	Multiple R's 1978
SATV, SATM, HSR	.397	.415
Q2, SATV, SATM, HSR	.415[1]	.424
MOTIV, SATV, SATM, HSR	.411[1]	.452[1]

[1]Significantly ($p < .05$) greater than the R^2 without the motivational question(s).

Table 3

Results of Cross-Validations of Formulas Computed from 1976 and 1978 Multiple Regression Analyses

Model	Multiple R With Original Sample	R (PGPA/GPA) With New Sample	Expected R From New Sample
1976 with Q2, SATV, SATM, and HSR as Predictors	.415	.406	.39
1976 with MOTIV, SATV, SATM, and HSR as Predictors	.411	.433	.38
1978 with Q2, SATV, SATM, and HSR as Predictors	.424	.392	.38
1978 with MOTIV, SATV, SATM, and HSR as Predictors	.458	.390	.42